DOCUMENT RESUME

ED 259 725 IR 011 803

AUTHOR Appleman, Merrie, Ed.
TITLE Summary Proceedings: The Conference on Electronic Text for Higher Education (San Diego, California, January 21-23, 1985). Report Number Eight of the Electronic Text Report Series.
INSTITUTION San Diego State Univ., CA. Center for Communications.
SPONS AGENCY Electronic Text Consortium.
PUB DATE 85
NOTE 88p.; For related documents, see IR 011 729, IR 011 772-775, IR 011 802, and ED 255 181. The program on Electronic Text for Higher Education is supported by Annenberg/CPB Project.
AVAILABLE FROM Center for Communications, San Diego State University, San Diego, CA 92182 ($10.00 per copy).
PUB TYPE Collected Works - Conference Proceedings (021) -- Viewpoints (120) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Access to Education; Computer Assisted Instruction; Computer Graphics; Computers; Conference Proceedings; Distance Education; Electronic Equipment; *Higher Education; Information Networks; Information Services; Instructional Design; Research and Development; *Telecommunications; *Videotex
IDENTIFIERS *Electronic Text

ABSTRACT

This report of the Conference on Electronic Text for Higher Education presents summaries of the principal presentations and discussions at each of eight sessions. Those sessions, with their presenters, include: (1) "Perspective: Electronic Text in Higher Education" (John Witherspoon, Mara Mayor); (2) "Theme and Variations: What Is Electronic Text?" (Kathleen Mulcahy, Molly Richardson, Martin Greenberger); (3) "What Works: The Effective Use of Electronic Text in the Learning Environment" (Chris Hassett, Lee Rockwell, Brenda Pfaehler, Rob Lippincott); (4) "Reaching Distant Learners" (Patrick Boyle, Mara Mayor, Thomas Wilson, Kenneth Stanton, Gary Strong); (5) "Communications Technology and American Higher Education" (Henry Geller); (6) "Producing the Product: Electronic Text That Works" (Gwen Nugent, P. J. Peters, Nancy Bamberger); (7) "Techniques for Assessing New Technology" (John Carey, David Dozier); and (8) "The Next Five Years: Perspectives on Planning" (Richard W. Jonsen, Robert Wyman, Barry Orton). Also included are brief biographical sketches of those making the presentations together with their educational or commercial affiliations. (JB)

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Electronic Text Consortium
Electronic Text for Higher Education
San Diego State University, University of Wisconsin, University of Nebraska, WGBH Boston

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SUMMARY PROCEEDINGS: THE CONFERENCE ON ELECTRONIC TEXT FOR HIGHER EDUCATION

Report Number Eight
of the
Electronic Text Report Series

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Report Number Eight
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Edited by

Merrie Appleman
The Center for Communications
San Diego State University

for the
Electronic Text Consortium

An Annenberg/CPB Project

The mandate of The Annenberg/CPB Project over a 15-year period is to create innovative, quality college-level materials and to demonstrate unique applications of telecommunications technologies in higher education problems.

1985

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Proceedings: Conference on Electronic Text for Higher Education

Introduction. This is a summary report of the Conference on Electronic Text for Higher Education, which was held in San Diego on January 21-23, 1985

The meeting was a function of the Project on Electronic Text for Higher Education, an Annenberg/CPB Project, which is conducted by the Electronic Text Consortium: San Diego State University, the University of Nebraska, the University of Wisconsin-Extension, and WGBH Boston.

Approximately 100 persons, most from institutions of higher education with resource participants from the electronic text industries and the project, attended the meeting.

This report summarizes the principal presentations and discussions. It is organized by conference session. Brief biographical sketches of those making the presentations will be found at the end of the proceedings.

SESSION ONE. Perspective: Electronic Text and Higher Education

Presenters: John Witherspoon, Director, The Center for Communications, San Diego State University

Mara Mayor, Director, The Annenberg/CPB Project

John Witherspoon

The Electronic Text Consortium (ETC) consists of the University of Nebraska, the University of Wisconsin, San Diego State University, and Public Television Station WGBH in Boston. We are jointly responsible for the project which brings us together today, and for this meeting.

The conference has several complementary purposes:

1. To report on the work that has been done by the Electronic Text Consortium in its project on Electronic Text for Higher Education.

2. To introduce the varieties of electronic text which we have available in the United States and, to some extent, in the rest of the world today. In very brief form, those are:

- Microcomputer Networks: CompuServe, The Source, Dow Jones, and local systems such as that operated by the Center for Communications
- Consumer Videotex Systems: Home information systems such as Gateway (represented at this gathering by Molly Richardson), Viewtron, and KEYFAX

- Teletext (one-way transmission of data and pictures), represented by Kathleen Mulcahy of CBS Extravision and by the University of Wisconsin's Infotext

3. To provide a context for related discussion within higher education, with particular emphasis on the problem of reaching the distant learner.

4. To assess new technology and plan for its implementation within higher education.

Mara Mayor

The changes occurring so rapidly in telecommunications create major opportunities for higher education. However, it is difficult to assess the potential of these technologies because even as we see their potential, the technologies themselves change. This is a world in which we could all use a crystal ball. We do not have a crystal ball, and instead we have to substitute a special mix of informed judgement and a willingness to take some risks.

That is what The Annenberg/CPB project tried to do when it funded the Electronic Text Consortium (ETC). The Project looks to the ETC not to provide definitive answers but, rather, to help define the questions and to help chart the way in this new field.

From The Project's point of view, one of the most interesting aspects of electronic text is its potential to alleviate what we affectionately think of as "the loneliness

of the long distant learner." In fact, the Consortium's activities pose a range of other interesting questions ranging from technical issues about frame creation to more general questions, such as: "Will students learn better with electronic text as an addition? Will the learning experience be more satisfying? Will the gains justify the cost? Will colleges and universities invest their own resources into developing electronic text for their students and institutions? What is the potential role for the commercial world in all of this?"

In addition to the Consortium's effort, The Annenberg/CPB Project funds a range of other demonstration projects. Because we have a television presence, people think the project is about television. It is not. It is really about the application of telecommunications in higher education with the goal of improving access to higher education and improving the quality of the resources for higher education.

Our projects look at a range of issues: the impact of telecommunications in the teaching of foreign language, the impact of telecommunications for simulating lab experiences, and the impact of graphics for helping students cope with more abstract concepts.

These projects all start with questions about how students can learn better, how faculty can teach better, and how telecommunications can have an effect on those kinds of questions. By asking these questions and then by dissemina-

ting the results, The Annenberg/CPB Project hopes to help higher education as it sorts out the educational potential of telecommunications.

SESSION TWO. Theme and Variations: What is Electronic Text?

Chair: Lee Rockwell, Manager, Educational Telecommunications, Nebraska ETV Network

Presenters: Kathleen Mulcahy, CBS Extravision

Molly Richardson, Manager, Special Projects, Times Mirror Videotex Services

Martin Greenberger, IBM Professor of Computer and Information Science, UCLA

Lee Rockwell

What is the condition of electronic text? You have got to know the territory before you proceed, and that is what we intend to do in this morning's session.

We will focus on three general areas:

1. Teletext, represented by Kathleen Mulcahy of CBS Extravision
2. Consumer videotex, represented by Molly Richardson of Gateway, Times Mirror Videotex Services, and
3. Microcomputer networks, discussed by Martin Greenberger from UCLA

Kathleen Mulcahy

Broadcast teletext is defined as digital data transmitted in the vertical blanking interval (VBI) of a television signal. It piggybacks on a regular signal. Our service, CBS Extravision, is available on the CBS network

signal in 90% of the country. It is a 24-hours-a-day service, updated about every 17 hours at our facility in California. The standard we use is the alpha-geometric, North American Broadcast Teletext Specification (NABTS), which is a subset of NAPLPS.

Among other services, we feature news, weather, and sports information. We also offer services for the deaf and the hearing-impaired. Through the teletext decoder, deaf people can receive captioning on about 10 hours of network programming a week. The deaf use our magazine as a primary resource for news and information.

The real bedrock of teletext is what it can offer at the local level. My main thrust is to talk to our television affiliates about setting up local teletext production centers. Last year, we inaugurated the first network affiliate teletext service in Charlotte, North Carolina. They now take 50 of our screens and produce 50 of their own local screens. Local production is also happening in Buffalo and production centers are planned for Salt Lake City and Seattle as well.

A major impediment to public awareness and acceptance of teletext has been the shortage of decoders available for sale. Approximately 1,000 people own decoders in the United States today. Decoders come in two configurations: decoder boxes which sit on top of television sets, and decoders which are built into the televisions themselves. Last year Panasonic marketed the first NABTS teletext decoder.

Although the price was high--$600 for a set-top box--the company has sold some. It was initally offered in major markets in the U.S. as well as Charlotte, where our first local service began. A new Panasonic decoder, installed in a 20-inch television set, will be available in March or April. Quasar is also introducing a set-top decoder box for regular televisions, and another company has announced plans to market both built-in and set-top decoders for teletext and videotex. The issue of cost is a major concern.

Consumer awareness of teletext is our biggest challenge. We are spending a lot of time introducing people to this new technology. During the summer, CBS and Metrotex (available through Metro Media, Channel 11, Los Angeles) offered coverage of the 1984 Olympics. CBS put 50 teletext receivers throughout Los Angeles--at tourist attractions, hotels, malls, etc. This had an important impact on consumer awareness. We were at our production headquarters in Hollywood around the clock for the entire two weeks of the Olympics, delivering up-to-the-min_te results.

This conference suggests to me that there is a whole world of electronic text services that commercial operators are sometimes unaware of. We can all profit by sharing our experience in a number of areas--technical, editorial, and marketing issues, for example. I recommend an open door policy.

Molly Richardson

Times Mirror Corporation is a large corporation in the information business. We are the parent company of the Los Angeles Times. We own the seventh largest cable company in the United States. We own broadcast television stations, book publishing companies, and forestry products companies. We own all kinds of things that are related to the dissemination of information.

It has been more than four years since we became interested in the concept of electronic publishing. Would there be a business here? Would it impact our print product, the Los Angeles Times? We are looking at this new technology and studying the impact that it is going to have on our futures.

Back in 1981, we started planning a field trial to study electronic publishing, using Telidon software and Canadian equipment, in both Orange County and Los Angeles County. Our intent was to look at a number of things: whether or not there was any sort of direction we should be taking in content development, how we should deliver the signal, and what price we should charge for the service.

We tested the trial service in Mission Viejo, a community in Orange County, with two-way cable. In Palos Verdes, a suburb in Los Angeles County, we used telephone delivery. Three hundred-fifty test households had the service from March until December, 1982. In September of that year, we introduced pricing of various schemes. Some

households dropped out while others joined up. At the end of 1982, we took all the terminals out of the households. In 1983, we studied the research we had collected--usage research and reactions from our users. This gave us the sense that as a corporation we should continue to plow ahead in the field.

In late 1983 and most of 1984, we spent a lot of time putting together a database. The database we have today is very much in the embryonic stage. We add to it constantly. It is not a test database. It is in use by subscribers right now.

In October of '84, we started marketing to subscribers. We have a very conservative approach as to how many subscribers we are going to be able to attract in a short amount of time. Our goal is approximately 2,000 households by late 1985. The reason we have to be so realistic is that the best ad campaign in the world cannot communicate what videotex is all about to a public that has no experience with the technology. Our emphasis right now is to go directly before the public and show them what the technology can do for them.

During the next twelve months, Gateway will serve the Orange County area exclusively, and emphasize consumer-oriented services. We are putting public access terminals in Orange County public libraries, high schools, and one intermediate school, and plans call for terminals in some of

the colleges as well. We hope we can provide access to others with AT&T equipment within the next six months.

Martin Greenberger

At MIT in 1962 with Project MAC, we coined the term "information utilities" with the idea that the kind of personal access that time-sharing allowed to large computer facilities would make computing much more accessible to businesses and consumers. This, we reasoned, would lead to the development of computing networks throughout the world that would parallel the developments witnessed in the communications and electric power industries.

During the 23 years that have passed since MAC, much of what has happened was fairly well anticipated, but much was not. I would like to discuss four things not anticipated that are likely to have a very profound influence on developments ahead.

1. Micro-Electronics: The dramatic success with micro-electronic technology, beginning with the transistor and followed by integrated circuitry and VLSI, and the high degree of miniaturization, economy, power, speed, and capacity that has been achieved, has far exceeded anything we could have foreseen in 1962.

2. Personal Computers: One result of micro-electronic technology is the personal computer. The personal computer dates back to the early 1960's, but its great commercial success did not come until twenty years later. The enormous

publicity and interest it has attracted, and the quantity of microsoftware developed, will have an enormous impact on the shape that computing assumes in the future.

3. More Powerful and Expensive Personal Computers: The first personal computers were modest in capacity by today's standards. Many of the ones attracting consumer excitement, such as the game computers, were on the low end of the price range. In the last year or two, there has been a marked shift in consumer interest to higher priced computers with much greater storage capacity and speeds of processing that rival those of the largest mainframe computers only a few years ago.

4. The Personal Computer with Modem: More and more, personal computers are being equipped and sold with modems for external communications. In 1983, seven percent of home computers were sold with modems. Today, that figure has more than doubled. There is also a great deal more communications software available. Personal computer networks are going to be an important factor in future developments.

At a symposium on "Electronic Publishing Plus," conducted last spring by the Washington Program of the Annenberg School of Communications, we examined trends in the use and supply of electronic services. We inquired about the behavioral parameters that affect media use, and we explored the role of new media such as videotex. (Electronic Publishing Plus: Media for a Technological Future, Martin Greenberger, ed., Knowledge Industry

Publications, Inc. 1985). We found numerous signs that computing/communications is becoming an encompassing environment for publishing, business, and everyday living.

Suppliers of electronic information services already form a much larger industry than is apparent to the general public. Current figures suggest that online database services such as Dow Jones News Retrieval, CompuServe, and The Source, along with specialty services for business and professionals, have left the R&D phase and are in many instances highly developed and profitable. Total revenues for the industry are estimated to reach over two billion dollars by the end of 1985.

SESSION THREE. What Works: The Effective Use of Electronic Text in the Learning Environment

Chair: John Carey, Director, Greystone Communications

Presenters: Chris Hassett, Assistant Director, The Center for Communications, San Diego State University

Lee Rockwell, Manager, Educational Telecommunications, Nebraska ETV

Brenda Pfaehler, Special Assistant to the Director, Telecommunications Division, University of Wisconsin

Rob Lippincott, Director of Interactive Technologies, WGBH Educational Foundation

John Carey

I want to preface this session with some basic definitions used in electronic text.

Teletext has three principal aspects: The signal piggybacks on an existing TV signal, the service is limited to between 50 and 100 screens, and it is a one-way delivery service.

Videotex, on the other hand, is a two-way service, i.e., interactive. Videotex is transmitted over the phone lines and provides a much larger database. Its applications are much more extensive than teletext since it can receive information. However, videotex services are much more expensive and, due to phone transmission, cause a traffic problem.

Both teletext and videotex exist on the national and local scene. Hybrid systems of these technologies crop up from time to time.

Chris Hassett

The Center is a research and development unit housed within the College of Professional Studies and Fine Arts at San Diego State University. We are among the few universities that have been involved in videotex for five years. Our experience has allowed us to develop in-house manuals and other documentation to guide us through the process of working with content specialists, instructional designers, writers, system operators, and other parties involved in videotex production. We continue working on the idea of a generic "production track," so that we can nimbly shift from one system to another without having to develop the same content over and over again.

Our work in the Electronic Text Consortium has centered on two basic areas of activity: research and production. From the beginning of the project, implementation was among our greatest concerns--we did not want to develop a product that was not going to have a home. Recognizing that the videotex field was developing in an uneven and often unpredictable way, we decided to buy a small microcomputer-based system of our own. With that decision, we expanded our role from information provider to full-fledged system operator.

The Center has developed three products for the Electronic Text Consortium: a text supplement for the telecourse "Congress: We the People," an engineering update service designed for distant engineering students, and an annotation database on videotex articles. The Center's development of the materials for "Congress: We the People" is not altogether unlike the development that has occurred at the University of Wisconsin. However, as operators of our own system, we felt that the features of that system should be exploited as fully as possible. Since it is an online system, we had the ability to freshen the materials on a regular basis with news items, other biographical information, an update on an exercise, a study guide or special note from a professor, and other materials of an updatable nature.

In the role of system operator, we enjoyed complete control over production, delivery, and evaluation of our products. Control is, in fact, a very important topic of conversation between commercial operators and the higher education community. Until now, many commercial operators have not been sensitive to the special needs of educators in using videotex for instructional purposes. The critical aspects of control are:

- Content control: This means total control of the content as it is displayed and retrieved by the student.

• Evaluation control: In an instructional setting, it is very important to know how the students are using the service. Which parts of the service are they using? Are there revisions which need to be made to make the database more instructionally effective? By keeping usage logs on our system users, we were able to monitor some of those issues.

• System Control: With the system right on hand, your team can tinker with the content of the database, the technical elements, and the evaluation considerations and ensure that you are doing the very most with the product that you can.

We recognize that our small, micro-based system has limited "reach". If we wished to serve students beyond the local area, we would need to use a somewhat grander distribution system. We are especially excited about what NAPLPS graphics can offer to instructional electronic text. We have developed a treatment of our "Congress" database for NAPLPS, and we look forward to transporting our database to a NAPLPS system.

Our second general area of activity has been research and evaluation. We developed a three-layered model for evaluation during the current Electronic Text Project--Levels I, II, and III--ranging from quick turn-around, formative projects, to full field testing, and longitudinal studies.

A few opinions and observations on this whole general area:

• First, content and service need to have dominance over gadgetry. It will be important to build our systems on equipment that has multiple uses for the users; that is, microcomputers.

• As developers of instruction and information, we need to be responsive to user life styles, interests, etc. We also need to allow for expression on the part of the user, and not just absorption. I also think that we can take some heart in the fact that more and more aspects of life are being mediated by computers, so that computer anxiety becomes less and less of a problem in promoting and implementing instructional programs.

In addition, we need to be brave enough to unpeg some of our assumptions about the roles of universities and libraries in society. We must recognize that these institutions cannot simply be repositories--they must become movers and shakers of information as well. The Center for Communications stands ready to work with institutions that are considering entering this new field.

Brenda Pfaehler

Education was the focus of our activities as a member of the Electronic Text Consortium. We were first asked to develop materials in support of "Congress: We the People," the PBS television series aimed at freshman and sophomore

college students. Programs were reviewed for learning objectives, themes, production strategies (both visual and audio) and for areas in which important reinforcement was needed.

We tried to develop an electronic text "experience" that would provide support to the television course. The ITV team developed some electronic text material and we reviewed it. We discovered that electronic text was not ITV or ETV or public television, but a new technology. We reconfigured our team to put something together that was the glue for all the different materials available from the Congress series.

Based on a review of current literature reporting educational uses of electronic text design team decided that UWEX developed materials should provide educational reinforcement for the main concepts and learning objectives of the television series, study guide and related textbooks in a manner which was easy to use and stimulating. For that reason a conjectural paradigm which emphasized the "what if" simulations and the manipulation of ideas was chosen for the structural support of the text materials. We needed something to get the students engaged in a learning experience so we began to develop simulations.

We had several major tasks. The first was to design flowcharts. Our first attempt at flowcharting produced games (as they were called) which were convoluted, and

tedious. The students became hopelessly lost. Later attempts produced a much cleaner and simpler flowchart.

Our second major task was to develop the materials in a couple of formats to make them modular. We put materials on CompuServe and on a diskette-based system for the Apple IIe. This provided for evaluation across technologies.

With script development we found some inherent limitations in designing for videotex. The screen size could contain 16 lines of 32 characters on CompuServe, the available videotex service. We learned that there is a fine line between Pablum and succinct, which necessitated the hiring of a journalist, who understood the value of a word.

Two field sites were selected from within the University of Wisconsin system. All students watched the television series as a part of an intensive six-week unit about Congress. The professor discussed the programs with the entire class. For the control group, this was the only exposure to the materials they received. The remaining students were divided as follows: (1) home use of videotex; (2) laboratory use of videotex; and (3) computer-emulator use.

Because one of the desired outcomes of the field text was that student users would like the technology and would find it a positive and educationally rewarding experience, a great deal of care was given to the pretest environment. Both faculty and technical support staff were very cooperative.

During the course of the six week field test, the full advantages of the videotex capabilities were afforded the students using the service both at home and in the laboratory setting. Students were encouraged to participate in on-going electronic mail with each other, their professor, a political science professor on another campus, and the Annenberg/CPB Project evaluator, as well as members of the instructional design team.

It is clear from this field test that it is possible to develop electronic text materials which support courses in higher education. Evaluation of the services showed that students who used the service in their home (i.e. CompuServe) liked the material more and did better on the tests. This positive attitude tends to spill over into enthusiasm for the course as well as to the actual test results. Distant learners can have "almost" contact with other students as well as professors, certainly compensating for the lack of classroom interaction. Furthermore, distant learners most likely cannot attend classes during "regular" school hours. Videotex offers them the maximum flexibility which distant learners desire.

Rob Lippincott

WGBH's role in public broadcasting has been both as a system operator (broadcast tower) and an information provider (producing programs). WGBH is now investigating what similar roles it may best serve in other technologies. The

station's activities are part of a broadly aimed research and development project. None of the products developed are ready for the market, but that will soon change.

WGBH's investigations of new technologies began in the early 1970's with program captioning activities. Experience in closed captioning led us to broadcast teletext, which sharpened our skills in frame creation, which gave rise to our current project in interactive videotex. Parallel work with videodiscs including computer linkages has further expanded our work in interactive technologies. All of these technologies seem to be naturally converging and the field becomes increasingly complex.

In every delivery technology, we approach the question of what works from both a curricular and a technological perspective. We have concluded that the successful curriculum package is not something that will replace existing materials, but rather something that will support and enhance the reach of current institutions and their offerings.

We created a videotex package entitled MASTERING MATH SKILLS. We targeted mathematics as our subject because it represents a highly needed set of skills--especially for adult students and distant learners. In order to accomplish this, we enlisted the help of Linda Falstein, the author of Basic Mathematics for College Students, a very successful textbook for post-secondary mathematics instruction. The goal was to develop an electronic text package which would

derive some measurable enhancement of curriculum segments embedded in her book.

We have chosen a stand-alone delivery system for the electronic text package in order to have it evaluated by students on the campus of the University of Massachusetts. We feel widely adopted and convenient electronic graphics delivery standard offered on a centralized system will best serve post-secondary learners, both on campus NAPLPS (the North American Presentation Level Protocol Syntax) the current standard.

(Editor's Note: Mr. Lippincott followed this discussion with a demonstration of several of the frames created for the mathematics course. The screens were created on Cableshare's Picture Painter frame creation system. This NAPLPS system is compatible with a number of different equipment configurations.)

Lee Rockwell

The Nebraska ETV network has a serious interest in the potential of electronic text as one element of public broadcasting's exploration of new technology. Our initial videotex efforts were jointly funded by the Corporation for Public Broadcasting and Cox Cable Communications in anticipation of a two-way interactive cable service, INDAX, which was planned for the Cox Cable system in Omaha. For this effort, we adapted three University of Nebraska independent study (correspondence) courses to include an interactive

videotex component. Although Cox never marketed its INDAX service, the videotex components were developed and evaluated, and considerable experience was gained in designing materials for an interactive system.

Based on this experience, the next logical step was to design a complete course for this medium and see it distributed on an operational videotex system. Our earlier work confirmed that instructional development is extremely expensive for this medium, and to justify costs the products must have the maximum potential for broad usage. This means that they must be designed to be compatible with a variety of delivery systems.

Our major task within the Electronic Text Consortium was to develop, from scratch, an independent study course for college credit. An introductory marketing course consisting of twelve lessons was selected because marketing is an increasingly popular subject and much of its approach--case studies and simulations--is especially suitable to interactive electronic delivery.

We identified three delivery modes.

1. Videotex: The course will be developed to the NAPLPS standard and will be offered on the Gateway and Keyfax videotex systems.

2. Microcomputer: A stand-alone, disk-based version for IBM PC's and compatible microcomputers has been developed. Completed paper assignments will be mailed by the student to the instructor.

3. TeleLearning: The stand-alone, disk-based version will be enhanced through the uploading and downloading of assignments between the student and instructor using the TeleLearning system.

Introductory Marketing can be offered either as a three-unit credit course or for non-credit applications. The complete course includes, in addition to the interactive component, a printed syllabus and textbook.

SESSION FOUR. Reaching Distant Learners

Chair: John Witherspoon, Director, The Center for Communications, San Diego State University

Presenters: Patrick Boyle, Chancellor, University of Wisconsin-Extension

Mara Mayor, Director, The Annenberg/CPB Project

Thomas Wilson, Director, The Open University, University of South Florida

Kenneth Stanton, Associate Director, Division of Educational Resources, University of South Florida

Gary Strong, California State Librarian

John Witherspoon

One of the American ideals is to provide education for just about anybody, just about any place. The notion of lifelong learning--the university without walls, the open university--has been going around for some years. Most of us have been not only advocates, but practitioners of that notion for some time. It is interesting to us that this idea is even more pertinent than it has ever been. We are in the middle of the Information Age where some 60 percent or more of all American occupations are related to information. We are witnessing very rapid changes in work patterns throughout the United States. We have an internationalization of many industries which is causing changes in work patterns. The automation phenomenon, for example, is causing great changes in the way we do things. Altogether,

we are looking at a period in American history in which all of us face multiple careers. How many of us in this room, for example, are engaged in occupations that could not have been dreamed of at the time we were in college?

What we face, then, in this business of serving distant learners, is not only the matter of addressing the people for whom the university or college is geographically inconvenient. We must also address the needs of populations that might not have been present in colleges and universities at all, due to work patterns or other matters. We are talking about education--sometimes at home, sometimes at the workplace, and sometimes at accessible learning centers.

Patrick Boyle

I am not a telecommunications expert, but I do know something about extending higher education resources to distant learners, because the institution I represent--The University of Wisconsin--has been in the business over 100 years. I would like to do two things: first of all, to tell you about what we do in Wisconsin, and, secondly, to express six concerns which I have as an administrator of an institution that provides broad and comprehensive programs to people in the State of Wisconsin and many other states.

Correspondence courses, one of the first innovative ways to meet distant learners, began at the University of Wisconsin-Extension in 1891. Today, we still reach more than 10,000 distant learners each year through independent

study by mail. We are also sending along audio and video cassette tape to help the learners through dramatized examples and visual descriptions.

The University of Wisconsin is no newcomer to the field of telecommunications. We have been involved in distant learning through the electronic media since 1917, when educational radio began in Wisconsin. WHA-TV began educational broadcasting in 1953. Today, we have added a lifetime learning channel on statewide cable television and an instructional television fixed service in Milwaukee. The University of Wisconsin-Extension also has an international reputation for innovation in teleconferencing techniques for distant learning. Our educational telephone network now connects 200 locations statewide.

All over Wisconsin, we are using computers to extend the resources of the universities. In county extension offices, we can help farmers make decisions on low cost dairy operations, management decisions, and equipment investments. Another computer program can help industries discover the best sites in a county to suit their relocation requirements. We can answer their questions in a few hours after receiving their telephone inquiry from anywhere in the world. We have also become involved in experiments with teletext and Infotext. These systems could be very useful in providing educational resources to the handicapped and other target audiences.

While Wisconsin has been a leader in innovative delivery systems to reach distant learners, it will be much more problematic to remain a leader in future, just as it is problematic for most other colleges and universities today. I would like to address six of the problems that most of us face as we look to the future.

My first major concern is competition among educational providers. The number of agencies, organizations and businesses entering the educational field today is increasing at an alarming rate. They are infringing on what has been perceived as the domain of institutions of higher education--especially continuing education. Because universities have been conservative and lagged behind in the development of software and programs, corporations have jumped in to create their own and to provide that information to other distant learners.

A second concern is information paralysis. Perhaps the greatest challenge for both educators and students will be to deal with the tremendous quantity of information available. Will our institutions of higher education become a general clearinghouse in the future? One of our special roles might be to become a quality control mechanism for all the information resources that are available.

The issue of "high tech vs. high touch" is a third concern. The technological revolution and the information explosion raise many questions about the relationship between technology and human resources. For example, will

the new county extension agent be a technician who can service the computer and change the software on demand? Or will people still need to relate to human beings?

My fourth concern is the cost of the duplication of effort. Investments in new technology are very expensive. With cutbacks in federal funding for public broadcasting and the AT&T break-up, we are facing expensive decisions merely to maintain our existing telecommunications, radio and television delivery systems. Other agencies are also dealing with this problem. In some cases, the technological investments they make may not be compatible with the systems purchased by other organizations; in other cases, the new investment may result in a duplication of services. How do we cooperate in order to reduce or maintain those costs? It will take some difficult studies to sort out our proper roles for inter-agency cooperation and sharing of expenses.

Academic acceptance is a fifth concern facing us today. While our electronic text experiment with political science students shows a greater retention of learning among those students who used interactive television text systems, there is a concern among educators that many of the educational software products are not of high enough quality in terms of content. The rewards or incentives for university faculty to get involved in the software development are not yet in place. In addition, there are questions of copyright and comparability of content prepared for electronic delivery systems vs. those of traditional print. The answer may lie

in a much stronger relationship between higher education and business in the future.

My sixth concern has to do with the teachers and the learners. While the elementary and secondary school students who have grown up with computers may be ready for innovative delivery systems, many of today's adult learners are not. And neither are many of the faculty of institutions of higher education. There is a strong need for faculty development in new technologies so that faculty can help learners relate to these new learning modes.

Additionally, I am concerned about what can be taught most effectively by the new delivery systems. We must pay close attention to the learner and the content in deciding what methods will be most effective in each specific instance.

Mara Mayor

The goal of The Annenberg/CPB Project is to provide access to higher education to the broadest possible audience and to use telecommunications to achieve that. We define telecommunications very broadly to include television, radio, audio, and electronic text--all sorts of electronic delivery of instruction.

One way to reach the distant learner is by using video and audio-based courses. This last fall, the first of The Project's video-based courses became available. Among them are the series "The Brain," "The Constitution: That Deli-

cate Balance," "Congress: We the People," "The Write Course," and "The New Literacy: An Introduction to Computers." What you see on television is, naturally, not the complete course, but rather the backbone of the course. For the student taking the course for credit, there are all sorts of supplementary printed materials.

The carriage figures are very good, both for those courses on prime time and those that are not. The use figures, in terms of college adoption, are also good. The figures are not entirely in, but somewhere over 500 colleges and universities this past semester offered one or more of the courses for credit to their distant learners. There are more courses in the pipeline. However, simply having a range of courses available leaves many other areas that need work. I would like to lay out some of the questions we are dealing with and some of the options we are looking at.

One of the major questions is the need for effective distribution systems. Broadcast by public television is clearly one option available to us. But it is a finite system; there are only so many hours in the day. Since we need to keep re-offering these courses, we threaten to clog the system. Thus, we are interested in other kinds of delivery systems--cable, ITFS, closed circuit, and commercial television. One of the things The Project has committed funding to is the National Narrowcast Service, using microwave. This will be yet another alternate highway. To

learn which Project courses are available in your area, call our central video distributor at 1-800-LEARNER.

The second big area of concern is marketing. We have started a national promotional campaign to get the word out that there is a Project, and a collection of credit-bearing courses. We have made an effort to work with groups who are interested in using the courses for continuing education, such as the state humanities councils. Another example is a collaboration with the American Library Association.

Another major question is the need to assure a degree-granting mechanism. The student needs to work with the local college offering the course for credit. Where there is no local institution offering the course, we should create a network of institutions which will provide the course anywhere in the country--a model similar to the correspondence course. Another option is to use national tests to enable the students to get evidence of successful completion of a course and then turn that evidence into credit.

A fourth major area is how to ensure a connection between faculty and students. The interactive potential of the new technologies is enormously attractive, and The Project is funding a number of efforts that are designed to explore that possibility. One is the Electronic Text Consortium; and the other is by the University of South Florida. We are also interested in exploring what TeleLearning has for making this kind of interaction more successful.

There is also a need for less expensive course formats. We have a budget of $10 million a year. That is not a lot of money in television terms--especially in our long form of television series. We have just funded a project on life span physiology that mixes video with audio--five hours of video, 20 hours of audio. This is more flexible in terms of finances and may be more appropriate for the student as well. Another option is simply to use audio more creatively than it has been done in the past--to develop a mass of audio components. Computer-based courses also have real possibilities, especially in the area of math.

Finally, one of the most difficult questions is, "What are all these courses going to add up to?" It is the question of curricular coherence. The Project's initial philosophy was to be open to courses in all areas of the postsecondary level. For openers, that was probably the right philosophy. About a year ago, we sharpened that focus and said the emphasis would be on the first two years of the undergraduate curriculum and aimed at the liberal arts baccalaureate. We now have in the works courses in introductory French and physics; an audio-based course in American history; a course in the history of women and the family; a basic course in applied mathematics; a course in English composition; and an introduction to computers. We are probably going to place a special emphasis on building courses in a couple of areas where we see great need, and not necessarily in a video format. The sciences cry out--

biology, chemistry, history of science. Math, statistics, algebra, and pre-calculus could all be computer-based courses. No one has wanted to get into philosophy and ethics. Comparative cultures is another area with a great need.

However, as we move into these areas, there is a potential tension within The Annenberg/CPB Project: the need to develop courses that will be adaptable and therefore widely used, and the need to be innovative. The trick is to take risks occasionally and develop courses that do not exist on most campuses because the faculty resources are not there. When traditional courses are funded, it will be important to make sure the approach is in fact academically innovative as well as rigorous.

Kenneth Stanton

The University of South Florida admitted its first students in 1960. We presently have 20 colleges within the university and a student body of better than 28,000. We are a commuter university: Only 3,000 of our students live on campus. We're also attracting a lot of people who are coming back to education. The average age of the student at the University of South Florida is 27 years. Located in Tampa, we cater to a large geographic area and have regional campuses in St. Petersburg, Sarasota, and Ft. Myers; an additional campus is planned for Lakeland.

From the beginning, the University of South Florida has provided a centralized media service--the Division of Educational Resources. Distant learners came into our vocabulary very early. We have a university-owned public television station in Tampa which devotes 40% of its broadcast day to academic programming. We have another public television station in Ft. Myers, two NPR/FM radio stations in Tampa and Ft. Myers, and two radio reading services for the blind in both locations. The City of Tampa recently granted a cable franchise, and we have plans to offer educational programming to the community via dedicated cable channels.

Our network of branch campuses created the need for a system to "move" faculty from one location to another. Thus, we started an ITFS system which transmits video and audio and permits questions and feedback from the distant students via telephone. We are now broadcasting in primarily two academic areas: the College of Engineering and the College of Business. The College of Engineering also participates in the FEEDS program--Florida Engineering Educational Delivery System.

In addition to ITFS transmission, we provide tapes to remote locations throughout the state. We are also engaged in teleconferencing. We have a satellite receiving dish and an extensive closed circuit system on campus which is used by professional and administrative groups to gain educational experience. Finally, we have the traditional media resource center with audio-visual classroom services.

Thomas Wilson

Many times we talk about the wrong factor in distance learning. Distance is not the problem. The real problem is isolation. This is what we are working on with The Annenberg/CPB Project.

The first serious distant learning was in correspondence schools. The result shows that most were highly effective--particularly for people who were homebound. However, these courses depended on the U.S. Mail. Similarly, the British developed a highly successful Open University program, using television and other communication means, but students had to drive to other sites to meet with a tutor.

Along came the Open University at the University of South Florida. It has grown to an enrollment of over 6,000 students a year. We were aware of the fact that students were working in isolation. They were feeling frustrated because of the lack of communication. Hence our application to the Annenberg/CPB Project for a grant to use computers as a form of communication rather than instruction. With the telecourse "Congress: We the People," as a foundation, standard text and study guides are used in conjunction with home-based terminals linked to our main frame.

Computer-based training makes sense particularly when you do not have a local-based teacher. One of the advantages of combining computer with television--two powerful

media--is that it will enable small schools to import the expertise to provide their students with an excellent education. We are particularly sensitive to this since we have a number of regional campuses.

We feel that computer-based training works best when it is supported by other media, when we have identified specific learning problems, and when we work to improve the communication between students and between teachers and students. Distant learning programs have traditionally been especially weak in the area of student-to-student and student-to-professor communication.

What are the costs in relation to benefits of software, systems, maintenance, machine cycles, network support, and workstations? We realize that pay-back costs are difficult to measure, just as they are difficult to measure in any educational modality. We wonder about the feasibility of providing training without an expert on site. We think we have overcome the problems associated with this by adding another link to traditionally televised instruction.

We do know that this approach saves money in travel costs. Last year we estimated that we would have saved our students just under a million dollars worth of gas by allowing them to take Open University courses. Our approach also permits self-paced instruction. We are pleased with what we are doing so far, but we recognize that we are still in the formative stage.

Gary E. Strong

In the adult literacy projects, we funded 27 public jurisdictions to establish 400 reading centers in 100 communities. We specifically targetted the illiterate adult not enrolled in any other educational program. The projects began in December, 1983. In the first year, we have trained about 7,000 learners and some 5,000 tutors. We have just added 19 additional communities (public library jurisdictions) with about another 70 community sites. In our legislatively-mandated evaluation of the first year of the projects, adult participants said that they would like to have more instruction, and would indeed be willing to use videotape or computers to assist them in math if it did not replace their one-on-one experience with the tutor. As you plan distant education and other kinds of learning opportunities, I would reinforce the fact that adults learn differently and want different kinds of situations that students in the traditional classroom offerings.

Our third project area is videoconferencing. We worked successfully with The Center for Communications last year on the California Library Telecommunications Project. We are continuing that this year with a series of videoconferences which we are aiming primarily at public library audiences. The first one, scheduled for March 21, will be a ninety minute videoconference with Jonathan Kozol, author of Illiterate America.

The public library today offers the potential to build linkages with adults and distant learning programs that is unlike any kind in the past. The resources are there, the buildings are built, the community rooms are in place. You have a faculty, if you will, that wants to connect people with learning, people with information, and people with knowledge. A report entitled Alliance for Excellence: Librarians Respond to a Nation at Risk called for a brand of alliance between the school, the home, and the library. We have much to do together.

SESSION FIVE. Communications Technology and American Higher Education

Introduction: Lionel Van Deerlin, Former Chair, House Subcommittee on Telecommunications

Speaker: Henry Geller, Director, Washington Center for Public Policy Research, Duke University

Lionel Van Deerlin

Alvin Toffler's "third wave"--the era of communications and information--is surely epitomized at this conference. The old order is changing faster than anyone can reckon. In academia as in industry, the old and the established are often left behind. Institutions such as the University of Nebraska, the University of Wisconsin and San Diego State University are providing the beacons for this new era, shedding light on a future still only dimly perceived in the ability of Americans to communicate with one another. At the end of this century we shall be using transmission systems only guessed at today. As a nation, we are on the cutting edge of these new technologies--and the three great universities convened here are an essential element in pointing the way.

I cannot tell you what a delight it is to introduce the guru, Henry Geller. I look to him as a mentor. Back in Congress, people without adequate preparation for some of the intricacies of this field have to deal with major issues. If they cannot find the right experts to advise them, Congress can sometimes do some very stupid things.

Less stupidity occurred on my subcommittee because of the friendship and the help we received from Henry Geller.

Henry Geller

There has been an enormous change in communication technology since World War II. We now have television, cable television, microwave, satellites, fiber optics, and the computer, which is so important to switching in telecommunications. These technologies have greatly increased the delivery of information and entertainment in the marketplace and have profoundly affected telecommunications and government policy.

The video field is now wide open because of the number of new technologies: DBS (Direct Broadcast Satellite), MMDS (Multi-channel, Multi-point Distribution Systems), VCR, and cable television. These technologies are, after all, only delivery systems. What matters to the public is not the system, but what is being delivered.

The enormous effect of the satellite is a good example of how technology has made a difference. In 1972, the Commission established an Open Skies Policy and RCA launched its satellite capacity. In 1975, HBO turned to the satellite for distribution of its pay channels. That allowed cable to succeed in the major markets with a 42 percent penetration. Because of the efficiency of the satellite's distribution, cable will increase its penetration to 60 percent by the end of the decade. In addition, because the

cable wire is there, a whole series of new services are possible.

This movement toward abundance in delivery systems has also made a difference in federal policy. The current trend is no longer towards the close supervision of the traditional "broadcast model" of regulation. Instead, current policy is closer to the "print model," with an overlay of the "common carrier model". For example, the Cable Television Act of 1984 forbids the cities and others to regulate individual programs and program services, thus moving the regulation of cable more toward the print model. As in print, the only things regulated by this Act are obscenity and libel. On the other hand, the Act builds in an overlay of the "common carrier model," requiring public access and leased-channel access on a nondiscriminatory, first come, first served basis. With the "print model" overlaid with the "common carrier model", the Act is not perfect, but it does reflect a trend that will continue in the future.

Another trend in the video field is that the FCC is allowing freer use of the spectrum. For example, a TV station can use the vertical blanking interval for teletext, for captioning, or other data. A FM subcarrier may now deliver common carrier radio paging, with TV stations also providing data. The policy is to encourage maximum, efficient use of the technology. A major problem with the FCC's marketplace approach is the lack of standards. Both in the area of AM stereo and teletext, the FCC has refused to pick

a standard. This may hold back the development of AM stereo, teletext and videotex.

In the common carrier area, the computer and the telephone have come together. The computer was deregulated while the telephone was regulated. The coming together of those two things forced policy makers to make governing decisions. They wisely chose deregulation because the area is one that now requires a very fast response in the marketplace.

The divestiture of AT&T reflects the desire of AT&T to enter this new information area. The telephone line is now like the power line and anything can be attached to it. Other carrier options in this wide-open area are the private branch exchange, Centrex (the local monopoly service), and the toll area (inter-exchange field). There are over 400 deregulated carriers, with the exception being AT&T. AT&T still comes under economic regulation and Computer II requirements. AT&T protests that this is very unfair and leads to inefficiencies. Above all, the future of telecommunications is "tailoring"--tailoring the services to the large customer. It is difficult for AT&T to tailor its services when there are two separate companies involved. Thus, AT&T wants to be deregulated like IBM. Eventually, it will be deregulated. The FCC today seems to be handicapping the field, but it has never been able to effectively regulate in this area.

Bell Operating Companies, the divested companies, are also under restrictions preventing their entry into the information services. They want to be involved in local area data transport networks. They wish to do protocol conversion so that the thousands of available asynchronous personal computers can communicate with the more sophisticated machines. Thus, the local telephone company would like to become the gateway for data just as they have been the gateway for voice. This would be very helpful to the university, to small businesses and to others. The problem, again, is that the local monopoly providing this is up against competition from IBM, who wants to provide the machines that would do it, and a group like GTE which would like to provide data processing. These companies argue that this is a deregulated area in which the local monopoly could cross-subsidize and dominate the market. This is a difficult issue to be resolved in the next few years.

Policy trends in the common carrier field are similar to those in video--an effort to avoid regulated competition, which is the worst of all possible worlds, and an effort to move ahead as quickly as possible with the transition. In the local area, the transition will take even longer and the problems will be greater. Huge issues such as competition, economic by-pass, local measured service, and economic depreciation will all have to be dealt with.

The same competition is entering the international arenas. In 1988, fiber optic cable will compete with

INTELSAT, which has a monopoly in satellite communications. The U.S. is moving to open up part of the field, specializing in areas that do not involve message toll, and thus avoiding undue interference with INTELSAT's operations. The problem is that market segmentation does not work. However, competition will come because the technology is changing. The technology is one of high-powered satellites with very efficient, cheap earth stations that are located near the user and tailored to the user. Policy must be consistent with technology, moving toward greater competition with COMSAT and INTELSAT.

With these developments, the university has to accommodate itself to the new telecommunications environment. The first thing the university must do is to reduce its costs in this area. Overall, about $70 billion are spent on university budgets and about 1.2 percent of those expenses are in telecommunications. It is important to reduce that cost and to integrate all the telecommunications on campus--creating a large, private branch exchange. One good example is Minnesota. When told by Northwest Bell that their switch was nearing capacity and it was necessary to re-build at a huge cost, Minnesota decided to build a $25 million digital, state-of-the-art system for themselves. Very high speed links going off campus to the computing center were also installed using the power lines at quite a savings. They now have both a very high capacity delivery system for data

(that can also be used for video) and protection against rising telephone costs.

Universities and higher education have accepted the computer. The computer itself is a very valuable tool, but when linked to the database and to others, it becomes even more powerful with all the advantages of electronic mail for student and professor exchanges. As a result, more and more universities are beginning to look at building networks. At Brown University, for example, each building has its own local network with a backbone network that connects the 125 buildings, called BRUNET. This system carries video, data, surveillance, monitoring, and regulates air conditioning and heating. It is a very ambitious system that has worked well for Brown.

Carnegie Mellon has introduced a powerful microprocessor for each student for distributed processing which is linked off campus. The physical bounds of the campus are being broken by these communications links. Another example of computer networks is Pittsburgh, which is building a fiber optic system with AT&T. These are expensive and ambitious.

These universities are at the cutting edge. Since the costs are extraordinary, each has sought a funder wanting a demonstration project. Carnegie Mellon sought out IBM; Pittsburgh, AT&T. In these projects, there is a breaking down of the physical boundaries and a linkage through communications. Computers and communications go together

and this has made an enormous difference in the education of students.

It is important that the university link up with industry for another reason. To attract high technology, states want research centers. For research centers, both strong universities and communications links are needed. By assisting and coordinating research in key technologies (communications and computers' nervous systems), Carnegie Mellon is trying to be like Japanese MITI for its region. Some universities are actually incubating high technologies.

Another area involving telecommunications and the university is the competition the university faces. As an important and expensive part of their operations, business has had to train people themselves. They are very innovative, using the latest communications and the best computer software. Some, like G.E., are even reaching out and making training a business. To meet this competition, the university must organize itself. One example in Texas is the Association of Higher Education of North Texas. Here nine universities banded together and decided to service the high tech industries in the Dallas/Ft. Worth area. They give courses out of the catalogue or tailor one to a particular company in engineering, computer science, business management, etc. The programming is brought to the workers on site, through satellite, through microwave, or through coaxial cable. There is exchange through telecommunication links with the university professor.

It is clear that the universities have a large stake in communications and computers in the Information Age. They are key for training the student to meet this new age. Therefore, it is commendable that we have projects like the Electronic Text Consortium with John Witherspoon and with the funding of The Annenberg/CPB Project. If we are to stay abreast, we need to have exploratory efforts of that nature. If we do not, then the opportunities pass to other countries like Western Europe and Japan.

SESSION SIX. Producing the Product: Electronic Text That Works

Chair: Rob Lippincott, Director of Interactive Technologies, WGBH Educational Foundation

Presenters: Gwen Nugent, Instructional Designer/Project Manager, KUON-TV

P.J. Peters, Computer Graphics Specialist, KUON-TV

Nancy Bamberger, Videotex Producer, The Center for Communications, San Diego State University

Gwen Nugent

At KUON, we have learned that when it comes to the development of electronic text, collaboration is the key. The instructional designer cannot do it alone; a content specialist is essential. Similarly, content specialists who do not have a background in interactive instruction and electronic media cannot do it by themselves either. On this project--the development of an introductory marketing course--we worked as a large team, composed of instructional designers, two content people, an independent study specialist, graphic designers, programmers, evaluators, and a national marketing and advisory council. When you are working on a large project with a tight timetable, the team approach is essential.

We have based our product development on principles of instructional design and computer assisted instruction (CAI). While the marketing course was created for two

delivery modes--videotex and floppy disk for personal computer--the basic instructional design procedures were essentially the same. The principal question facing us was, "How can we best use the electronic text media to present the information?" To answer this question, the design team drew on two instructional models.

1. The Tutorial Model: This type of instructional package typically begins with a brief review of a concept or principle (or a presentation of new material), followed by a series of multiple choice and short answer questions. If the student answers these initial questions correctly, he or she is presented with application questions. If at any point the student answers incorrectly, he or she would receive appropriate feedback and remedial information before moving to the "right answer" branch. This model allows the person who knows the subject to progress very quickly. It is also a very hierarchical approach.

2. The Simulation Model: This model teaches the subject by placing the student within the context of the subject matter--in this case, a marketing situation. The simulation presumes that the student has already been introduced to the concept, and offers an opportunity to apply the new knowledge. An advantage of this model is that it permits "multiple correct responses"--gray areas which the computer is able to emulate much more effectively than print.

Before beginning the design process, it is critical to thoroughly analyze the capabilities and limitations of the

interactive system you are working with. If you do not have a complete understanding of your system, you run the risk of designing something that cannot be achieved with your software and hardware configuration. For example, some systems only allow the student to enter multiple choice responses; short answer questions are not possible. Others do not keep track of the student's responses and thus do not branch based on earlier answers. This last feature is very critical to have in simulations.

We found that the wrong answers are really the hard part with interactive instruction design, because you then have to do some diagnostics and decide, "How can we give the student this information so that they really understand why they missed the question the first time?" Particularly in simulation exercises, it is a real challenge to the content person to determine the outcome of an incorrect response. It is a challenge, but it is also a lot of fun.

P.J. Peters

During my work on electronic text projects in Nebraska, I have used a number of systems for computer-aided graphic design, including the Norpak Information Provider System; a Tandy 6530 with special graphics software; and the Cable-Share Picture Painter.

I used the Norpak system to develop frames for INDAX--Cox Cable's videotex service. Based on Telidon technology (the Canadian videotex system), the Norpak has "geometric

picture processors" containing the basic building blocks needed to construct graphic images--dots, lines, rectangles, and polygons--with some editing capabililty. Sixteen colors are available on the system, but only a few were useful because the others created eye tension. The system characteristics of INDAX itself posed several limitations. INDAX used an alphamosaic standard--a low resolution system that constructs graphics from large, tile-shaped elements. Other system limitations in screen size and byte counts meant that elaborate designs and color changes were impossible.

As the Nebraska Project progressed, I gave up the Norpak system in favor of a Tandy 6530--a dumb terminal hooked directly into the mainframe. Completed frames were retrieved using a Radio Shack microcomputer and software created specially by Cox Cable.

In my opinion, the low-resolution graphics of the alphamosaic standard do not meet the expectations or standards of a college level course. Additionally, the amount of textual material in a college level course signficantly reduces the amount of space for visual images, and alphamosaic graphics require at least 50% of the frame to be effective.

During the current project--the course on marketing--I used the CableShare Picture Painter, which I found much more satisfying to work with. This is a very high resolution system featuring sixteen default colors which can be altered according to the artist's desire. The system can create

circles, arcs, upper and lower case letters, several font styles, blinking, simple animation, and other features.

I am often asked how long it takes to prepare the graphics. Because of all the variables, there is no concrete answer to this question. My experience suggests to me that the artist does not work under the most ideal conditions, but rather works according to two variables: 1) what has to be done, and; 2) how much time is available to do the job. Under those parameters, you do what you can. Nonetheless, we have come a long way in the area of computer-aided graphics design, and it has all been worth it.

Nancy Bamberger

We at the Center consider ourselves "old-timers" in the field. We feel we have gained the perspective of both a system operator and an information provider to commercial operators. While the field is much too young for anyone to claim that they have discovered the hard and fast ways of doing things, I can confidently say that there are some things that should absolutely not be done: "the seven deadly sins of videotex production."

Sin #1: "User Gets No Respect"

In interactive technologies, it is extremely important to focus on the user because the whole medium is built on the premise that the user is in control. How do we involve the user? We write in the second person when appropriate.

We deliver role-playing exercises and self-assessment tests and then give diagnostic feedback that continues to involve the user. It is also important to solicit feedback from potential users during production to ensure that the product reflects their interests and needs.

Sin #2: "Dazzled by the Hardware"

When a new technology takes center stage, there is a tendency to be dazzled by all the opportunities offered by the engineers' electronic wizardry. However, in the end, it is the content, and not the gadetry, that is really going to create the videotex market. My point is not to be dazzled by all the options one can provide in the design, but to follow your common sense and say "Is this function appropriate? Will it add to the user's understanding?"

Sin #3: "Fractured Flowcharts"

Flowcharts are the very foundation of any interactive product. There is a tendency to think that if we have gathered the content, done the research, and written the script, we can just input it into the computer and the software will do all the magic. But I feel if you are not able to show the plan on paper first, then no amount of computer smartness will link it together into an effective database.

Sin #4: "Group Think: Thou Shalt not Committee."

I use the word "committee" in this deadly sin because "committee," to me, connotes compromise and endless hours of meetings. I prefer a team approach. During this current project, I worked with two other content developers and a system operator. Our operation began with a lot of intensive brainstorming during flowchart design. To ensure that each section of the database had a consistent style and personality, we divided up writing responsibilities and then collaborated on polishing and editing.

Sin #5: "Wordicide"

Since the average videotex user is unaccustomed to reading off the television screen, writers must choose their words very carefully. I have found that editing is even more important than the writing process. Secondly, I feel it is important to limit yourself to one thought per screen. When the user has read the thought and pushed the button for the next screen, it is almost as if they are saying "O.K., I've got that thought. What's next?"

Sin #6: "Too Graphic For Words"

The current computer technology for graphic design allows us to do any number of things--blinking, animation--in an array of colors. However, operators of videotex systems are learning that the viewers sometimes tire of a graphic after seeing it the second, third, or fourth time.

Further, it takes time to build the picture and this adds to the connect time.

Sin #7: "Bugs in the System"

We have developed a systematic approach to debugging. We follow every branch in the flowchart to make sure that the user's input will elicit the proper screens. It is important to remember that every interaction must work and work well for the first time user. If it does not work for them the first time, there may not be any second or third or fourth time users.

SESSION SEVEN. Techniques for Assessing New Technology

Chair: Richard W. Jonsen, Deputy Director, Western Interstate Commission for Higher Education

Presenters: John Carey, Director, Greystone Communications

David Dozier, Associate Professor, Journalism, San Diego State University, and Director, Electronic Text Laboratory

Richard Jonsen

This session focuses on evaluation research and theory. Among other things, our evaluation must include an assessment of the educational appropriateness of new technologies--the "fit" between the technologies and various kinds of subject matter. Technology evaluation is also the key to intelligent planning toward the integration of technology in the "classroom" and the "campus" of the future.

John Carey

Our evaluation project is examining a range of questions we feel are important for the typical college that is trying to make sense out of electronic text: What technology is available? Does it work? What does it cost? What trends are emerging in the industry? What are the relevant organizational issues, such as adoption within educational institutions? What impact do the new technologies have on instruction?

There is a real problem for those of us who are trying to realistically assess where this field is going: We are involved in an industry that is surrounded by a great deal of hyperbole and false expectations. The industry, for example, makes extravagant projections of consumer adoption of personal computers and other new technologies. Where are these extravagant predictions coming from? Commercial researchers rarely report their methods. It appears that, in many cases, the researchers pick a number that stretches credibility to its ultimate limit and then reduce it by one percent. They then find a way to justify how they reached their conclusion.

This tendency toward hyperbole complicates the planning efforts of higher education. College and university planners should not base their decisions on the projections of technology growth unless they are aware of the underlying assumptions of the research and have corrected for fallacies in the methodology.

Planners should also be wary of three types of research commonly used in the field. The first is the Delphi method --a poll of the experts in the field, which is very rarely accurate. A second popular method is "substitution"--the notion that some people will substitute a new technology for an old one if it allows them to accomplish at least some of the same things they were able to do before. This, too, is often used in misleading ways. Finally, researchers frequently resort to a kind of abstract survey, in which

respondents are asked to indicate their interest in a technology or service that they have never been exposed to. This last method is not unlike asking someone whether they would be willing to buy a dog that flies.

While no method is foolproof, there are two evaluation techniques which can be reasonably valuable exercises. The first is to conduct a field test of the technology and then survey the participants about their reactions. Though this is not entirely accurate, it has the virtue of giving the participants some experience on which to base their response. The second method is a historical analysis which uses data on the growth and penetration of comparable technologies as a basis for prediction of new technological development.

Based on our research to date, their are four important issues that need to be addressed by someone who is considering these technologies.

1. Stand-alone services versus the large conglomerate services: The industry today is a mixture of large conglomerate services on the one hand, and smaller, local or stand-alone services on the other. This tendency applies to education as well. It is not likely that there will be a national educational videotex service in the near future. It is simply too expensive. This means that colleges and universities have a number of options. They can become information providers for the large conglomerates, such as Gateway, KEYCOM and Viewtron, or they can inaugurate their

own local system, such as the one developed by San Diego State University. The latter model seems to make more sense from both a financial and administrative point of view.

2. Dedicated terminals versus the adapted personal computer: At least in the short term, the dedicated videotex terminal is very problematic. Many of the "new generation" videotex services are catering to the adapted PC.

3. Standardization: Technical standards are a key concern, especially for teletext, which has been severely crippled by the lack of an industry-wide policy.

4. Transmission Costs: The cost of local telephone service is critical to the viability of a videotex system. Teletext is an attractive medium, because the transmission costs are so low. However, there are a variety of combinations and mixtures of transmission media that help contain videotex transmission costs. Some information can be downloaded to a personal computer, or can be distributed to the users on floppy disk. Also promising are the local area data transports, which offer greatly reduced rates for data delivery.

The research conducted by the Electronic Text Consortium at the University of Wisconsin examined videotex services delivered on CompuServe, at university lab centers, and control groups. The evaluation focussed on electronic text as a learning tool. Definite conclusions are always

elusive, but we seem to be learning a lot of things about how this technology can be used.

David Dozier

During the past several years, the Center for Communications has had the opportunity to use a number of research methods while evaluating electronic text technology. These methods range from highly qualitative approaches such as focus groups and depth interviews, to quantitative number-crunching techniques. The qualitative techniques suffer from the same plight that John Carey described in his discussion of the abstract survey: They ask participants to give feedback on technologies and services they have never experienced. Similarly, if we conduct a large sample phone survey about videotex, we cannot find a population familiar enough with the technology to generate reliable results.

Like many researchers, we originally approached our evaluation of electronic text with an orientation toward large sample surveys and quantitative analysis. I prefer to refer to this class of techniques as "extensive methods." Typically, the "extensive" researcher finds large numbers of people and asks them closed-ended questions--questions that presume a limited number of answers. The researcher then enters a number-crunching phase in order to generalize the results to the population at large.

The extensive methods present two major problems to evaluators of electronic text. First, electronic text has

not yet achieved the high levels of penetration necessary to generate large sample populations--an integral ingredient in the extensive approach. Secondly, in trimming questionnaires to a reasonable length, researchers sometimes discard questions which may prove significant once the technology has gained wider acceptance.

The problems with the extensive methods suggest a different, "intensive" approach in which smaller numbers of people are engaged in hands-on activity with the technology. The intensive methods include focus groups, depth interviews, direct and indirect observation, and examination of system usage logs, among other things. Although these methods may result in rather weak inferences, they enable the researcher to become sensitive to the correct issues.

All of the intensive videotex research conducted at the Center for Communications during the last five years has involved pretest measures of some important variables (projected adoption and attitudes toward the technology), as well as measures during and after the simulation itself. Again, the research has emphasized <u>projected</u> adoption since there has never been widespread use of videotex to measure <u>actual</u> adoption.

In general, our simulations are constructed on a microcomputer to emulate an electronic text service. One simulation might include, for example, a demonstration of an online course registration service. A service of this kind

is relatively simple to simulate, yet would be very costly to implement.

Not suprisingly, the intensive model has both strengths and weaknesses. On the positive side, it allows the researcher to manipulate the intervention and expose potential users to very precise sorts of simulations with high levels of internal validity. A serious weakness of the model, on the other hand, is the danger that people who are pre-disposed in favor of the technology will "self-select" themselves as participants in the research. There is an artificiality to the laboratory setting which poses a threat to experimental validity. Researchers must also contend with the "gee whiz" factor--the tendency for participants' reactions to be skewed because of their initial fascination with the novelty of the simulation. Finally, the smaller samples used in the intensive method make it difficult to generalize the results of the experiment to the larger population.

One of the major studies conducted last fall at the Center for Communications introduced 90 students to an electronic text simulation and measured levels of projected adoption. By paying the students incentives to participate, we feel we reduced, if not eliminated, the problem of self-selection. We also examined the notion that potential users will not accept electronic text unless they perceive that there is a "critical mass" of valuable services which outweigh the costs of adopting the new technology.

In other research activities at The Center, we explored the behavioral disposition of the distant learner, including the conditions affecting a distant learner's willingness to adopt electronic text services. The results showed that considerable hands-on training sessions would be needed to convince users of the relative advantages of electronic text.

SESSION EIGHT. The Next Five Years: Perspectives on Planning

Chair: Philip Rubin, Rubin, Bednarek and Associates

Presenters: Richard W. Jonsen, Deputy Director, Western Interstate Commission for Higher Education

Robert Wyman, Telecommunications Consultant, The Wyman Group Communication Technologies

Barry Orton, Associate Professor, Communication Programs, University of Wisconsin-Extension, and Chair, Telecommunications Strategic Planning Task Force, University of Wisconsin-Extension

Philip Rubin

The greatest difficulty facing the electronic services industry today is the high cost and limited availability of the hardware. The industry's failure thus far to make inexpensive decoders and interactive terminals available to the public is suffocating the information providers and system operators.

A breakthrough may be on the horizon. Two leading companies recently entered an agreement to produce and distribute affordable consumer television sets equipped with decoders. Norpak--one of the original developers of NAPLPS equipment--will design the decoder boards and Samsung Electronics of Korea will manufacture and install the devices for distribution by Christmas, 1985. The product line will include medium-priced TV sets with built-in

teletext decoders; cable-ready add-on decoders; and low-priced, two-way interactive decoders with keyboard, modem, and protocol conversion features. The Samsung sets will implement the full service reference module (SRM) and will be capable of picking up the Viewtron, Gateway, KEYFAX, and the other services. You can expect the price to be affordable. If the Korean sets sell well, or even moderately well, the other manufacturers will follow very quickly with comparable products of their own.

Home computers are presently in 13 percent of all the homes in the country. In 1985, six million computers costing under $2,000 will be shipped to dealers. Clearly, these devices become videotex terminals when a modem is added. That is a very sizable market which service providers, if motivated, could aggressively attack.

However, the coming affordable technology is going to be a very big disappointment if the quality of the services does not improve. In searching for success, many of these services are trying to do too many things for too many people and not doing any of them well. The Source, CompuServe, and Dow Jones have approximately 400,000 subscribers right now. Those numbers, which doubled in the last year, are expected to increase substantially again. On the other hand, Viewtron still has not attracted 5,000 subscribers. The answer to the riddle may be "wrong services, wrong audience, wrong time, and wrong price." For example, anyone who thinks there is a market for people to pay phone access

charges to read newspapers over the screen has the wrong service in mind. Anybody who plays only to the upper class has the wrong audience in mind. To receive CBS's Extravision and the NBC programs, you must spend close to $2,000 on a decoder and TV set--the wrong price for the service. Advertising, brokerage fees, and handling fees--not subscription fees--must finance these services if the audience is to broaden.

In addition, the text companies ought to offer a "paper alternative" to their electronic services. The public continues to have an appetite for paper. With the introduction of a low-cost thermal printer later this year by several manufacturers, a paper alternative will become viable.

Finally, a word about the videodisc. Six years ago, videodisc players cost $20,000 each. Today, videodisc machines are more readily affordable--$600, $700, or a little more. Soon, they will have the capability to play both compact discs and laser discs. However, the videodisc has a fundamental problem. If it had arrived on the scene in the early 1970s, it would have taken the place of the videocassette machines. If it had come into being three or four years later--say, in 1985 or 1986--it would have been a computer peripheral. Right now, it is in a "no man's land": Its video capabilities have been totally surpassed by the VCR, and computers are not yet ready to use laser discs. But the videodisc will soon evolve into what it should have

been in the first place: a computer peripheral, and a means to store enormous amounts of data including video images for computers.

Richard Jonsen

WICHE is an interstate compact agency established 30 years ago by the 13 western states to stimulate cooperative approaches to higher education. We are also charged with the responsibility for reviewing the needs and resources of higher education and reporting to the states--usually the executive offices, especially to governors, legislatures and higher education authorities--about unfilled needs that could be met through cooperation.

Why are we interested in the growing use of information technology? In the past year or so, many colleges and universities have become computer-intensive. This trend promises to continue as new electronic delivery systems are developed to replace campus phone lines. Meanwhile, there has been a serious absence of coordinated telecommunications policy and planning within the higher education community.

The acquisition of sophisticated new technologies has most frequently been driven by departmental, school, or campus decisions and rarely by system or state decision. In general, the activities in higher education are guided by market impulses such as the availability of resources or the potential for status and other professional rewards. This orientation toward independent, decentralized decision-

making and market considerations has caused higher education to operate in a largely unplanned way. The result: Decisions made by individual campuses or departments may not lead to the most efficient use of resources--computer hardware and software, for example.

The time has come for more intensive planning at both the system and state levels of higher education, where considerable integration and coordinated use of resources and energies are possible. A recent survey conducted by WICHE and the Pacific Mountain Network indicates that higher education institutions share many of our concerns about policy and planning. The survey attracted a response rate of more than 60% from the 550 colleges and universities in the western states. The results represent a snapshot of the current use of information technologies in higher education and the purposes for which those technologies are being used. Among other things, we asked about barriers to the effective use of telecommunications and about needed policy and cooperative developments. Most importantly, there was a recognition that more needs to be done in terms of policy development. Among the highlights of the results:

- 80% of the institutions reported that inadequate faculty rewards and incentives were obstacles to strengthening the use of information technologies.

- 69% said inadequate information was a significant barrier, and 50% reported that inadequate information among

policy makers was an obstacle to more appropriate use of information technology.

- 75% said that the encouragement of cooperation between states and institutions was important or very important.

Some of the critical policy questions relating to the use of information technology are:

1. Is there a need to encourage the development of integrated systems at the institutional, state, and regional levels in order to maximize the distributional potential of information technologies? What would such systems look like?

2. Should mechanisms be established at the state level to coordinate the use of information technologies? Most of our states have coordinating agencies in higher education. Most of them are rather weak with respect to their authority to affect coordination, or to insist on cooperation among universities.

3. Can the use of information technologies to deliver instruction be evaluated in comparision to traditional classroom models? Evaluation here includes cost/benefit and productivity considerations. If no productivity gains are found in the technologies, what reason would state legislators have to appropriate the large sums of money that are required in the future to build either hardware systems or software or production capabilities?

Robert Wyman

It is time for us to realize that we are not in education, but in the "learning business." As a result of being in the learning business, we have to address sociological trends and take a look at our institutions before we start addressing available technologies.

Among the significant sociological trends are the growing role of science and technology; the internationalization of American life linked to the phenomenon of technological change; the changes in the occupational structure of American society; demographic changes; and, most importantly, a rising dissatisfaction with our educational system. An increasing number of corporations are developing educational programs, receiving accreditation, moving in the direction of narrowcasting, and addressing some needs that we have let slip by.

These trends suggest that educational institutions should make programmatical needs their first priority during the next five years. Colleges need to reflect student and community needs as opposed to the interests of faculty. We also need to focus on staff development. These needs can form the basis for the selection of appropriate, cost-effective technologies. To do this, however, the top institutional decision-makers--not the media center employees--must tackle the issue of telecommunications planning. However, in many cases, the top decision-makers and their staff have

little knowledge or experience in the telecommunications field.

We need to discard the notion that a course offered via telecommunications is something different than a course taught in the classroom. If it is indeed different, it should be serviced through a common evaluation system. However, the community colleges' statewide Academic Senate has developed guidelines which establish special criteria for evaluating telecommunications offerings.

In sum, campuses need to examine the changes in society, and take a look at how we evaluate what we are offering to the community. If we do not want to go that route, we will be looking back over our shoulder in five years at a whole new wave of educational institutions which will replace many of our existing systems.

We also need to assess the options available through telecommunications--options such as electronic text, TV satellite, ITFS, and broadband microwave--and develop integrated systems master-planning, based on cost-effectiveness and constituency needs.

Finally, a prognosis for the future:

- In five years, we will be looking at in-depth, diagnostic testing and new approaches to assessment to help colleges, their staffs, and their students make transitions into future roles. Real student needs will be evaluated as they relate to a changed society--an information society. Evaluation criteria will change from measurements of inputs

such as faculty, admission requirements, and library holdings to measurements of output. The competency-based exams now required for various kinds of graduation are an example of this "output" orientation.

- The faculty will perform the same tasks as today, but in a different way. They will spend more time keeping up with their disciplines because of the new materials being generated in the information society.

- As our society grows older, so will the average age of our students--a trend that can already be traced today. College staff and curriculum will have to be redesigned in order to recognize that demographic change.

- The college of the future will not be a stand-alone institution providing in and of itself all aspects of the student's educational program. Linkages with other private and public institutions will be all important to its survival and significance in the future.

- Most students will have their own personal computers which will be linked to data banks on and off campus.

- Colleges of tomorrow will need to address corporate training needs. Colleges must create a new image--one of responsiveness, flexibility, and willingness to change the way we do business. Colleges of tomorrow--the ones that survive--will combine a medieval style of professional tutoring with a futuristic brand of instructional delivery.

Barry Orton

We often tend to forget that planning is not a rational process, but a political and allocative process. Planning provides a structure in which these processes of politics and allocation can occur. Even university planning is essentially allocative in nature. We have to examine telecommunications planning at the university within that political context.

For telecommunications planning to be successful in higher education, it must be integrated into the normal planning processes of the university. The rising capital and operating costs of telecommunications systems demand broadband solutions--integrated solutions with voice, data, and video combined into one package. If this integrated approach is to occur, however, the planning process must be led by a "zealot"--a person high in the university administration--who can mediate the separate requests of the ITV, voice and data people, and make a single pitch for integration and integration dollars. Without an integrated planning process, it is likely that these three groups will still compete for resources on their own. The bulk of those resources will go to the voice people, who keep the telephone system alive. The remainder of funds will go to the people who keep the data and computer system going and, lastly, to the television people.

A recent article in The Chronicle of Higher Education cited the telecommunications planning process in the

California State University system, and quoted Thomas West, Director of the Division of Information Systems. West suggests that the president should designate an executive officer at the vice presidential level or higher to be responsible for the planning process. He recommends doing a needs assessment and then putting together a plan to meet those needs. He also suggests hiring consultants and a special staff for the planning process, rather than leaving the tasks to existing staff. Finally, he recommends giving control of the completed project to some kind of on-going planning committee and a full-time telecommunications manager.

Universities interested in negotiating deals with cable companies should watch out for the "changed circumstances clause." A federal bill--the Cable Communications Act of 1984--strips away much of the municipal authority to hold cable companies to many provisions of their contracts.

My major disappointment with the electronic text services I have seen is the shallow depth of information they provide. Like Phil Rubin, I think a paper back-up is needed. The one major, lasting, tool of education is the book. Until we can get anything near equivalent to the book, electronic text will be a supplemental technology more than a mainstream technology.

Biographies of Panelists

Nancy J. Bamberger
San Diego State University

Nancy J. Bamberger is a producer of electronic text and interactive video programs at the Center for Communications, San Diego State University. She was responsible for San Diego-based production activities of the Electronic Text Consortium, an activity of the Annenberg/CPB Project. Ms. Bamberger graduated from the University of Texas in Education and Mathematics, and received her Master's degree in Mass Communications from San Diego State University. (Session 6)

Patrick G. Boyle
University of Wisconsin-Extension

Patrick G. Boyle is currently Chancellor of the University of Wisconsin-Extension. He taught graduate and undergraduate courses in the UW-Madison Department of Agricultural and Extension Education from 1958 through 1974.

A native of Mauston, Wisonsin, Patrick Boyle earned his Ph.D. in Extension Education from the University of Wisconsin in 1957. He has chaired several national Extension committees and is the author of numerous articles and publications, including a book, Planning Better Programs (McGraw-Hill, 1981).

Dr. Boyle served on the UW System President's Advisory Group on Extension in 1981, and has led the UW System effort to integrate extension faculty/staff and programs as part of the triple mission of the universities: research, teaching, and extension. (Session 4)

John Carey
Greystone Communications

Dr. John Carey is Director of Greystone Communications in New York. He is also an Adjunct Professor in the Graduate Program in Interactive Telecommunications at New York University. During the past several years, Dr. Carey has published numerous articles and been invited to lecture on applications and trends for new telecommunications technologies. He received his Ph.D. from the University of Pennsylvania, the Annenberg School of Communications. (Sessions 3, and 7)

David M. Dozier
San Diego State University

Dr. David Dozier is an Associate Professor of Journalism at San Diego State University where he has been active in research of emerging communication technologies. He is currently directing major research activities in educational applications of electronic text for the Electronic Text Consortium. Dr. Dozier is a member of the standing committee for Communication Technology and Policy of the Association for Education in Journalism and Mass Communication. His Ph.D. is in Communication Research from Stanford University. (Session 7)

Henry Geller
Center for Public Policy Research, Duke University

Henry Geller is the Director of Duke University's Washington Center for Public Policy Research. From 1978-81, he was Administrator of the National Telecommunications and Information Administration in the Department of Commerce. Most of his career was spent at the Federal Communications Commission, where he was General Counsel in the period of 1964-1970. (Session 5)

Martin Greenberger
UCLA

Martin Greenberger is Professor of Public Policy and Analysis at the UCLA Graduate School of Management where he holds the IBM Chair in Computers and Information Systems. Formerly, he was Professor of Mathematical Sciences at the Johns Hopkins University, having served there also as Chairman of Computer Science and Director of Information Processing. Dr. Greenberger has been a Guggenheim Fellow and Visiting Professor at the University of California at Berkeley, Isaac Taylor Visiting Professor of Energy at the Technion Israel Institute of Technology, and Visiting Professor at the Stanford University Graduate School of Business Administration. He received his Ph.D. from Harvard University in 1958. (Session 2)

Christopher A. Hassett
San Diego State University

Christopher A. Hassett is Assistant Director of the Center for Communications, San Diego State University where he directs San Diego-based activities of the Program on Electronic Text for Higher Education. Mr. Hassett has directed several videotex projects and assists in the development and management of other projects involving

videodisc, microcomputer applications, and telecommunications. Mr. Hassett was Research Director of the Public Telecommunications Project, conducted under the auspices of the State of California as a planning activity for the State's entire public sector. He received his B.S. in mathematics and psychology from the University of California at Santa Cruz, holds a secondary teaching credential, and has studied in San Diego State University's graduate program in Radio and Television. (Session 3)

Richard W. Jonsen
Western Interstate Commission for Higher Education

Richard W. Jonsen has been the Deputy Director of the Western Interstate Commission for Higher Education, located in Boulder, Colorado, since 1977. Prior to joining WICHE, Jonsen worked with the Education Commission of the States in Denver as Project Director, State Policy and Independent Higher Education. He spent several years in the School of Education at Syracuse University as Assistant Dean and Assistant Professor of Higher Education. Before that, he served in several positions at the University of Santa Clara, and a M.A. in English at San Jose State College; he earned his Ph.D. in Higher Education at Stanford University. (Session 8)

Rob Lippincott
WGBH Boston

At WGBH, Mr. Lippincott is responsible for the development, management and coordination of projects in the areas of interactive videodisc, videotex, and microcomputer software. Since 1981 he has served as producer/project director for seven interactive videodiscs used in industry, academic and museum settings. He has taught a "Seminar on Interactive Media" at the Harvard University graduate school of Education and lectured at The Center for Life Long Learning at Harvard. (Sessions 3 and 6)

Mara Mayor
The Annenberg/CPB Project

Mara Mayor is Director of the Annenberg/CPB Project. Prior to joining the Project's staff, she worked with the Media Program of the National Endowment for the Humanities for five years. She had previously taught at the University of Connecticut for thirteen years, where she was an Associate Professor of History. Her Ph.D. is in American Studies from Yale University. (Sessions 1 and 4)

Kathleen Mulcahy
CBS Extravision

Kathleen Mulcahy has been the Marketing Director for CBS Extravision, the teletext service of the CBS Television Network since it began in 1981. Prior to joining CBS, she worked in sales for an engineering design firm specializing in industrial video systems. She holds a B.S. in Economics from Sophia University, Tokyo, Japan, and an M.A. in Film/Television from UCLA. (Session 2)

Gwen Nugent
University of Nebraska Television

Dr. Gwen Nugent is currently the instructional designer/project manager for the University of Nebraska's Electronic Text Project. She is also an Adjunct Assistant Professor in the Department of Educational Psychology.

Dr. Nugent has been involved in the design, production, and utilization of instructional media resources for the past 15 years. In addition to her work in C.A.I., she is also a recognized expert in the area of videodisc design and was project manager for University of Nebraska's videodisc work in deaf education. (Session 6)

Barry Orton
University of Wisconsin-Extension

Barry Orton is Associate Professor of Telecommunications at the University of Wisconsin-Extension and Chairman of its Department of Communication. He is also Chair of Extension's Long-Range Telecommunications Planning Task Force and of the faculty advisory committee to WHA-TV and Radio. Dr. Orton specializes in telecommunications planning, and works particularly with municipal governments and broadband telecommunications policy. He was the founder of the National Association of Telecommunications Officers and Advisors of the National League of Cities. Professor Orton is also an Associate Faculty member of the UW-Madison Department of Urban and Regional Planning. He holds a Ph.D. and Masters in City and Regional Planning from Rutgers and a B.S. in Business and Economics from Lehigh. (Session 8)

P.J. Peters
University of Nebraska

P.J. Peters is currently a Computer Graphics Specialist for the University of Nebraska's Electronic Text Project. She also teaches Computer Graphics at Nebraska Wesleyan University. She has recently written and published articles

on computer graphics and made presentations on its use in videotex to various organizations on the national, regional, and local level. (Session 6)

Brenda Pfaehler
University of Wisconsin-Extension

Brenda Pfaehler is the Annenberg/CPB Electronic Text Project Director at the University of Wisconsin-Extension.

Prior to her position as Project Director at the UWEX Telecommunications Division, Ms. Pfaehler served as Special Assistant to the State Superintendent of Public Instruction and in that capacity served as a member of the Educational Communication Board of the State of Wisconsin. She is also a former member of the City of Madison Broadband Telecommunications Cable Regulatory Board.

Currently Ms. Pfaehler is completing a doctoral program in Curriculum and Policy Studies and Telecommunications Policy. Her dissertation is centering around the potential use of electronic text in higher education. (Session 3)

Molly Richardson
Times Mirror Videotex Services

Since its inception four years ago, Dr. Molly Richardson has served as the Manager of Special Projects for Gateway, Times Mirror's videotex service. Her Ed.D. in Curriculum Development and Instructional Media is from the University of Buffalo. (Session 2)

Lee Rockwell
University of Nebraska

Lee Rockwell is Manager of Educational Telecommunications for the Nebraska ETV Network and Associate Professor of Journalism at the University of Nebraska-Lincoln. For the past three years he has directed the Nebraska Network's research and demonstration efforts in videotex and electronic text, along with the Network's investigation of other technologies. Prior to assuming this position, he served for 13 years as Executive Director of the Nebraska Educational Television Council for Higher Education, Inc. (Sessions 2 and 3)

Philip A. Rubin
Rubin, Bednarek, and Associates

Philip Rubin is a Principal of Rubin, Bednarek, and Associates, an engineering consulting firm in Washington, D.C. For 13 years Rubin served as chief scientist for the

Corporation for Public Broadcasting where he was responsible for technical research and development. Prior to joining CPB he was involved in satellite engineering. (Session 8)

Kenneth Dale Stanton
University of South Florida

Kenneth Stanton is the Director of Instructional Media, the Associate Director of the Division of Educational Resources, and the Associate General Manager of WUSF-TV-FM and WSVP-TV-FM at the University of South Florida. He is the current Chairman of Post Secondary Adult Learning Council and a member of the Board of Directors of the Council of Instructional Communications of the Southeastern Educational Communications Association. (Session 4)

Gary E. Strong
California State Library

Gary E. Strong has been serving as California State Librarian since his appointment in 1980. As State Librarian, he acts as Chief Executive Officer of the California Library Services Board, a body responsible for promoting resource sharing and services to underserved populations. Mr. Strong is currently President of the Library Administration and Management Association (LAMA), a division of the American Library Association and is presently the Chairman of the Chief Executive Officers of State Library Agencies (COSLA). (Session 4)

Lionel Van Deerlin

A 1937 graduate in journalism at the University of Southern California, former Representative Lionel Van Deerlin (D-Calif.) followed a news career in both print and broadcast media before being elected to Congress in 1962.

He is best remembered in Washington for his five-year chairmanship of the House Communications subcommittee, during which Congress began its first fullscale reconsideration of the outdated Communications Act of 1934.

The former congressman's newspaper experience included stints on the Minneapolis Tribute, Baltimore Sun and two San Diego dailies -- the old Scripps-Howard Sun and the Daily Journal, which Van Deerlin served as city editor. (Session 5)

Thomas C. Wilson
The Open University, University of South Florida

Dr. Thomas Wilson has been serving as the Director of The Open University at the University of South Florida since his appointment in 1975. In addition to his duties as Director of The Open University, Dr. Wilson is an Associate Professor in the College of Education where he has taught for the past 17 years. His Ed.D. is in Instructional Technology from Wayne State University. (Session 4)

John P. Witherspoon
San Diego State University

John P. Witherspoon is Professor of Telecommunications and Film and Director of the Center for Communications at San Diego State University where he is currently director of the project on Electronic Text for Higher Education. Mr. Witherspoon is also a planner and consultant in telecommunications, specializing in applications of communication technology.

For the four years ending in mid-1979, Mr. Witherspoon served as President of the Public Service Satellite Consortium. During the previous decade, he was the first principal executive for television of the Corporation for Public Broadcasting, Vice-President of KCET Los Angeles, and the first General Manager of KPBS-TV/FM San Diego. He was the founding Chairman of the Board of Directors of National Public Radio. (Sessions 1 and 4)

Robert Wyman
The Wyman Group Communication Technologies

Robert Wyman is the president of The Wyman Group, a consulting and marketing firm in Sacramento. He is currently chair of the California State Chancellor of Community Colleges Advisory Committee on Telecommunications for which he is directing a study to develop a process for Telecommunications Master Planning for the 107 Community Colleges in California.

Mr. Wyman has been active as a professional educator for over thirty years. He taught at the high school, community college and university level, and served as chief instructional officer at one of California's major community colleges.

For the past fifteen years Mr. Wyman has been actively involved in the application of new and emerging technologies and how they might be utilized in post-secondary settings. (Session 8)